

**REMARKS**

The Examiner objected to claims 1, 3-9, 15, 17, 19, 21-25, 28 and 31-33 "because of the following informalities: "resister" (Claim 1, line 7) should be "resistor"." Since claim 1 has been canceled, the preceding objection is moot.

The Examiner objected to claims 21 and 25 as being dependent, provided a proper Terminal Disclaimer is also filed, upon a rejected base claim, but would be allowable if rewritten to overcome the rejection and in independent form including all of the limitations of the base claim and any intervening claims. Applicants gratefully acknowledge the Examiner's indication of allowable subject matter.

The Examiner rejected claims 1, 3-9, 15, 17, 19, 21-25, 28 and 31-33 under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1-32 of U.S. Patent No. 6,647,614B1. In response, Applicants have filed a terminal disclaimer herewith.

The Examiner rejected claims 1, 3-9, 15, 17, 19, 21-25, 28 and 31-33 under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the enablement requirement.

The Examiner rejected claims 1, 3-8, 15, 17, 19, 22-24 and 32 under 35 U.S.C. §102(b) as allegedly being anticipated by Gofuku et al. (IEEE 0569-5503/91/000-0524) hereinafter '524.

The Examiner rejected claims 9, 28, 31 and 33 under 35 U.S.C. §103(a) as allegedly unpatentable over Gofuku.

Applicants respectfully traverse the §112, §102 and §103 rejections with the following arguments.

**35 U.S.C. §112, First Paragraph**

The Examiner rejected claims 1, 3-9, 15, 17, 19, 21-25, 28 and 31-33 under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the enablement requirement.

Claims 1 and 22-23 have been canceled. Thus, the rejection of claims 1 under 35 U.S.C. §112, first paragraph and 22-23 is moot.

The Examiner argues that the "[t]he claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, since the specifications as written fails to provide examples, fails to provide specific composition or the like an artisan would be hard pressed to make or use the claimed invention. Applicants have not disclosed any elements such as the specific compositions of the laser radiation, its power density, the heat distribution, the laser device such as Nd:YAG laser?, the optimized laser conditions, the amount of heat needed to modify the resistance of the exposed resistor portion, the reacting temperature of the resistive materials and the like ... , and therefore it is held that an artisan would not be able to carry out the claimed invention without undue experimentation. What is the range of possible resistivities ? What isomeric forms of the composition will make this invention work? This is unknown and Applicants fail to provide such information."

Applicants respectfully contend that claims 3-9, 15, 17, 19, 21, and 24-25, 28 and 31-33 do comply with the enablement requirement for at least the followings three reasons.

A first reason that claims 3-9, 15, 17, 19, 21, and 24-25, 28 and 31-33 comply with the enablement requirement is that by issuing a judicially created double patenting rejection the

Examiner has alleged that claims 3-9, 15, 17, 19, 21, and 24-25, 28 and 31-33 of the present patent application are obvious over claims 1-32 of USP 6,647,614. Applicants contend, however, that the specification of USP 6,647,614 is the same as the specification in the present patent application. Yet, USP 6,647,614 is an issued patent whose claims 1-32 are legally to be patentable and therefore to satisfy the enablement requirement. Thus, if claims 1-32 of USP 6,647,614 satisfy the enablement requirement, which is legally presumed, then it follows that claims 3-9, 15, 17, 19, 21, and 24-25, 28 and 31-33 of the present patent application also satisfy the enablement requirement.

A second reason that claims 3-9, 15, 17, 19, 21, and 24-25, 28 and 31-33 comply with the enablement requirement is that the United States Patent and Trademark Office recognizes that the descriptive laser data called for by the Examiner is not required to satisfy enablement, as evidenced by the large number of issued patents (in addition to USP 6,647,614 discussed *supra*) claiming use of laser radiation wherein the specification does not comprise the descriptive laser data called for by the Examiner. The following three recently issued patents are representative of the many issued patents claiming use of laser radiation wherein the specification does not comprise the descriptive laser data called for by the Examiner:

USP 6,755,849 issued on June 29, 2004 to Gowda et al. (claim 15);

USP 6,720,523 issued on April 13, 2004 to Troitski (claim 1);

USP 6,690,474 issued on February 10, 2004 to Shirley (claims 5 and 18).

A third reason that claims 3-9, 15, 17, 19, 21, and 24-25, 28 and 31-33 comply with the

enablement requirement is that the specification provides sufficient guidance as to how to implement the claimed invention by use of laser radiation without undue experimentation. For example, page 4, line 19 - page 5, line 13 of the specification recites:

“An interaction of the laser radiation 14 with the resistor 20 serves to induce a change in electrical resistance of the resistor 20 by heating the resistor 20. Such heating causes chemical or structural changes in the resistor 20, which results in an electrical resistance change. Thus, if the resistor 20 has an electrical resistance  $R_1$  prior to exposure to the laser radiation 14, then the resistor 20 will have an electrical resistance  $R_2$  after exposure to the laser radiation 14, wherein  $R_2$  is unequal to  $R_1$ .  $R_1$  and  $R_2$  are related according to either  $R_2 > R_1$  or  $R_2 < R_1$ , depending on the chemical or structural changes that occur in the resistor 20 as a consequence of the exposure to the laser radiation 14. The laser radiation 14 must be sufficiently energetic to provide the required heating of the resistor 20, and a minimum required energy flux of the laser radiation 14 depends on the material composition of the resistor 20. If the resistor 20 comprises a metal, then the present invention will be effective for a wide range of wavelengths of the laser radiation 14, since a metal is characterized by a continuum of energy levels of the conduction electrons rather than discrete energy levels for absorbing the laser radiation 14. Noting that the energy of a photon of the laser radiation 14 varies inversely with the wavelength of the photon (or equivalently of the laser radiation 14), the laser radiation 14 should be sufficiently focused so that the aforementioned energy flux requirement is satisfied.”

**35 U.S.C. §102(b)**

The Examiner rejected claims 1, 3-8, 15, 17, 19, 22-24 and 32 under 35 U.S.C. §102(b) as allegedly being anticipated by Gofuku et al. (IEEE 0569-5503/91/000-0524) hereinafter '524.

Claim 1 has been canceled.

Applicants respectfully contend that Gofuku does not anticipate claim 24, because Gofuku does not teach each and every feature of claim 24. For example, Gofuku does not teach the feature: "wherein the resistor is coupled to a semiconductor substrate".

The Examiner argues "As applied to claim 24, the '524 teaches that the resistor (Cf. Fig. 1, TFR) is coupled to the substrate (Cf. Fig. 1) used in high-density packaging and high speed signal transmission semiconductor or device (Cf. Page 524, paragraph 1, lines 15 ff.)."

In response, Applicants note that Gofuku, page 524, Section 1, lines 15-17 recite: "A copper-polyimide multilayer substrate is suited to high-density packaging and high speed signal transmission". In the preceding portion of Gofuku cited by the Examiner, there is absolutely no disclosure of a semiconductor substrate, as required by claim 24. In fact, there is no disclosure of a semiconductor substrate anywhere in the entire Gofuku reference. Therefore, Gofuku does not teach the preceding feature of claim 24.

Based on the preceding arguments, Applicants respectfully maintain that Gofuku does not anticipate claim 24, and that claim 24 is in condition for allowance. Since claims 3-8, 15, 17, 19, 22-24 and 32 depend from claim 24, Applicants contend that claims 3-8, 15, 17, 19, 22-24, and 32 are likewise in condition for allowance.

In addition with respect to claims 3-6, Gofuku does not disclose enough information to

determine whether  $F=1$  or  $F<1$  in Gofuku.

In addition with respect to claim 7, Gofuku does not disclose  $R_2 > R_1$ . Gofuku teaches the exact opposite, namely  $R_2 < R_1$ . See Gofuku, page 527, lines 21-23 ("The irradiated and modified TFR has lower resistance by 15 % compared to that of non-modified TFR").

In addition with respect to claim 17, Gofuku does not disclose the feature: "wherein the resistor in the providing step includes a polycrystalline metal, wherein the exposing step transforms a **first crystalline phase** of the polycrystalline metal into a second crystalline phase of the polycrystalline metal within the portion of the resistor" (emphasis added). The Examiner argues that "the '524 teaches that the laser radiation effectively modifies the **amorphous** metallic material RuO<sub>2</sub> into lead-borosilicate glass (Cf. Fig. 8 & 9, b; Page 527, lines 25 ff.)" (emphasis added). In response, Applicants maintain that the preceding argument by the Examiner does not make any sense, since "amorphous" does not satisfy the limitation of "first crystalline phase".

**35 U.S.C. §103(a)**

The Examiner rejected claims 9, 28, 31 and 33 under 35 U.S.C. §103(a) as allegedly unpatentable over Gofuku.

Since claims 9, 28, 31 and 33 depend from claim 24, which Applicants have argued *supra* to be patentable under 35 U.S.C. §102(b), Applicants maintain that claims 9, 28, 31 and 33 are not unpatentable under 35 U.S.C. §103(a).

In addition with respect to claim 9, Gofuku does not teach or suggest: "wherein a product of F and L does not exceed about 1 micron".

The Examiner argues: "the '524 teaches a process of manufacturing a buried based resistor in copper-polyimide substrate which reads on applicants' claimed invention, except for having the width F and the length L of the resistor at 1 micron size... It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the width F and the length L of the resistor at 1 micron size, since it is known in the art that the wavelength applied in the laser process is approximately 1 micrometer (Cf. Page 526, paragraph 3-1, lines 12 ff). Thus it can affect any material starting from that size."

In response, Applicants respectfully contend that the Examiner has misinterpreted the preceding citation to page 526 of Gofuku, which displays in Fig. 6 the absorption coefficient versus wavelength of the polyimide used by Gofuku. Gofuku specifically discloses use of a wavelength of 1.06 microns (see Gofuku, page 5287 line. addition, Gofuku discloses nothing about the value of the product of F and L, which is what claim 9 actually recites. What the Examiner alleges the value of the product of F and L *can be* is not legally relevant. What is

legally relevant is what the prior art teaches or suggest, and the Examiner has not produced any prior art reference that teaches or suggests a product of F and L not exceeding about 1 micron. Thus, the Examiner has not established a *prima facie* case of obviousness in relation to claim 9.

In addition with respect to claims 26 and 31, Gofuku does not teach or suggest: "testing the resistor after the exposing step to determine whether the second electrical resistance is within  $R_t \pm \Delta R_t$ ."

The Examiner argues: "As applied to claims 28 and 31, the '524 teaches a process of manufacturing a buried based resistor in copper-polyimide substrate which reads on applicants' claimed invention, except for measuring, testing and laser-irradiating the resistor to obtain the targeted value.... It would have been obvious to one of ordinary skill in the art at the time the invention was made to measure, test and laser-irradiate the resistor to obtain the targeted value during the laser process, since it is known in the art that critical data of different radiation and varied resistances are recorded (Cf Page 527, Fig. 7, lines 4 ff.) to optimize the laser process."

In response, Applicants respectfully contend that FIG. 7 of Gofuku is merely a plot of the resistance change of the TFRs versus number of pulse shots is not a teaching or suggestion of "testing the resistor after the exposing step to determine whether the second electrical resistance is within  $R_t \pm \Delta R_t$ ." Additionally, Gofuku does not teach or suggest "iterating" feature of claim 31, and the Examiner has not even addressed said "iterating" feature of claim 31. Thus, the Examiner has not established a *prima facie* case of obviousness in relation to claims 26 and 31.

In addition with respect to claim 33, Gofuku does not teach or suggest: "conductively



coupling an electrical circuit element to the first electrically conductive contact and to the second electrically conductive, wherein an electrical circuit is formed such that the electrical circuit includes the electrical circuit element and the resistor”.

The Examiner argues: “It would have been obvious to one of ordinary skill in the art at the time the invention was made to conductively couple an electrical circuit element to the first electrically conductive contact and to the second electrically conductive, wherein an electrical circuit is formed such that the electrical circuit includes the electrical circuit element and the resistor, since it is known and is old in this art that a resistor can be applied in a high-density packaging and in high speed signal transmission semiconductors or devices (Cf Page 524, paragraph 1, lines 15 ff).”

In response, Applicants respectfully contend that the Examiner has alleged what is known without providing evidence in the prior art to support the contention. What is relevant is not what the Examiner thinks is known, but rather what is known in the prior art. The Examiner is legally required to support what is allegedly known by proper citations from the prior art. Thus, the Examiner has not established a *prima facie* case of obviousness in relation to claim 33.

**CONCLUSION**

Based on the preceding arguments, Applicants respectfully believe that all pending claims and the entire application meet the acceptance criteria for allowance and therefore request favorable action. If the Examiner believes that anything further would be helpful to place the application in better condition for allowance, Applicants invite the Examiner to contact Applicants' representative at the telephone number listed below.

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